UNITED NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/SBSTA/2002/INF.5
24 May 2002

ENGLISH ONLY

SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
Sixteenth session
Bonn, 5–14 June 2002
Item 4 (b) of the provisional agenda

METHODOLOGICAL ISSUES

GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

Report of a workshop to elaborate draft technical guidance on adjustments under Article 5.2 of the Kyoto Protocol

Note by the secretariat

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GE.02-61580

I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), in its decision 21/CP.7, requested the secretariat to organize a workshop prior to, and possibly one or more workshops after, the sixteenth session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol with the participation of greenhouse gas (GHG) inventory experts and other experts nominated to the UNFCCC roster of experts and experts involved in the preparation of the Intergovernmental Panel on Climate Change (IPCC) report entitled "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" (hereinafter referred to as the IPCC good practice guidance). The purpose of the first workshop would be to elaborate draft technical guidance on methodologies for adjustments under Article 5, paragraph 2, building upon submissions by Parties contained in documents FCCC/SBSTA/2000/MISC.1 and Add.1, FCCC/SBSTA/2000/MISC.7 and Add.1-2, as well as FCCC/TP/2000/1, for consideration by the SBSTA at its sixteenth session. At that session, the SBSTA should define more precisely the scope of the second workshop (FCCC/CP/2001/13/Add.3).

2. By that same decision, the COP requested the SBSTA to complete technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, building upon its draft decision on adjustments and the outcome of the process described in paragraph 1 above, for consideration by the COP at its ninth session, with a view to recommending, at that session, such technical guidance for adoption by the Conference of the Parties serving as the meeting of the Parties (COP/MOP) to the Kyoto Protocol at its first session.

B. Scope of the note

3. The purpose of this note is to report on the results of the workshop organized prior to the sixteenth session of the SBSTA in response to the mandate described in paragraph 1 above. The draft technical guidance on methodologies for adjustments under Article 5, paragraph 2, elaborated at the workshop following the mandate of decision 21/CP.7 is included as an annex to this note.

C. Possible action by the SBSTA

4. The SBSTA may wish to consider the information contained in this note and its annex. It may also wish to endorse or modify the conclusions reached by the participants in the workshop, including the approach for further work.

II. PROCEEDINGS

5. The workshop was held in Athens, Greece, from 3 to 5 April 2002, with the financial support of Canada and Norway and the logistical support of Greece, which hosted the workshop. It was organized by the UNFCCC secretariat in close cooperation with the Government of Greece through the National Observatory of Athens. The agenda of the workshop can be found on the secretariat's web site (http://unfccc.int/sessions/workshop/030402/index.html).[1]

6. Forty-seven national experts, mainly GHG inventory experts, from 34 Parties participated in the workshop. Seventeen experts were funded, out of whom 13 were from Parties not included in Annex I to the Convention[2] and four were from Parties included in Annex I to the Convention (Annex I Parties) with economies in transition. All the experts had previously participated in one or more of the following

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[1] All documents referenced in this note which have been posted on the secretariat's web site can be found at this location.

[2] Two invited experts from non-Annex I Parties were not able to attend the workshop.

activities: development of the IPCC good practice guidance, the technical review of Annex I Parties' GHG inventories,[3] and negotiations on guidelines under Articles 5, 7 and 8 of the Kyoto Protocol. In addition, experts from two intergovernmental organizations, including the IPCC, and from two non-governmental organizations participated in the workshop. The list of participants can be found on the web site of the secretariat.

7. The workshop was co-chaired by Mr. Newton Paciornik (Brazil) and Mr. Audun Rosland (Norway), who accepted the invitation of the Chairman of the SBSTA, Mr. Halldor Thorgeirsson (Iceland), to conduct this task in his absence. The workshop was officially opened with the reading of a note from the Chairman of the SBSTA,[4] and a welcome address by Mr. Dimitris Lalas, Director of the National Observatory of Athens.

8. The opening note by the Chairman provided guidance to the participants relating to the mandate and objective of the workshop and highlighted the methodological and technical character of the work entailed in the elaboration of the draft technical guidance on methodologies for adjustments.

9. The participants had before them the following two working papers,[5] which had been prepared by the secretariat under the guidance of the chairman of the SBSTA and the assistance of the co-chairmen of the workshop:

(a) Working paper 1 (2002), which provides an overview of the history of the process on adjustments under Article 5, paragraph 2, as well as a compilation of all decisions of the COP and conclusions of the SBSTA on this matter; and

(b) Working paper 2 (2002), which compiles elements and a proposed structure for a draft technical guidance on methodologies for adjustments under Article 5, paragraph 2. This draft guidance builds upon decision 21/CP.7 (Good practice guidance and adjustments under Article 5, paragraph 2 of the Kyoto Protocol) and relevant provisions of decisions 22/CP.7 (Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol) and 23/CP.7 (Guidelines for review under Article 8 of the Kyoto Protocol) (see FCCC/CP/2001/13/Add.3) and the various documents that had been discussed previously in this context, in particular those mentioned in paragraph 1 above.[6] The experience gained during the trial period of the technical review of GHG inventories of Annex I Parties has also been incorporated.

10. The workshop's deliberations were conducted mainly in plenary sessions, but also through four sectoral working groups according to the IPCC sectors energy, industrial processes, agriculture and waste.[7] The work of each of the sectoral working groups was conducted with the assistance of two

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[3] The technical review of GHG inventories from Annex I Parties as established by decision 6/CP.5 (see document FCCC/CP/1999/7).

[4] The Chairman of the SBSTA was unable to attend the workshop as he was chairing another SBSTA workshop to explore the information contained in the Third Assessment Report of the IPCC, held in Bonn, 4-6 April 2002. The note by the Chairman on the present workshop can be found on the secretariat's web site (http://unfccc.int/sessions/workshop/030402/index.html).

[5] The working papers and the presentations made by the secretariat can be found on the secretariat's website (http://unfccc.int/sessions/workshop/030402/index.html).

[6] In addition to the documents mentioned in paragraph 1 above, namely FCCC/SBSTA/2000/MISC.1 and Add.1, FCCC/SBSTA/2000/MISC.7 and Add.1-2, and FCCC/TP/2000/1, the secretariat used the following documents in compiling the elements and proposed structure for a draft technical guidance contained in working paper 2 (2002): FCCC/SBSTA/2000/INF.5/Add.2 and working paper 3 (a) to (g) (2000), which can be found on the secretariat's web site (http://unfccc.int/sessions/workshop/030402/index.html).

[7] According to decision 21/CP.7, technical guidance on methodologies for adjustments under Article 5, paragraph 2, for estimates of anthropogenic emissions and removals from land use, land-use change and forestry,

co-facilitators, namely Ms. Kristin Rypdal (Norway) and Mr. Samir Amous (Tunisia) in energy, Mr. Manfred Ritter (Austria) and Mr. William Kojo Agyemang-Bonsu (Ghana) in industrial processes, Mr. Jim Penman (United Kingdom of Great Britain and Northern Ireland) and Mr. Eduardo Calvo (Peru) in agriculture, and Ms. Katarina Mareckova (Slovakia) and Mr. Art Jaques (Canada) in the waste sector.

11. Deliberations in the plenary sessions focused on the elements and proposed structure for a draft technical guidance on methodologies for adjustments, the objective and general approach of such methodologies, including the description of generally applicable methods, and methodological approaches to ensure that the adjusted estimates are conservative. In their elaboration of the draft technical guidance, participants gave full consideration to the procedures for calculation, application and reporting of adjustments as established under the provisions of the guidelines for review under Article 8 of the Kyoto Protocol.

12. The purpose of the sectoral working groups was to compile, where appropriate, guidance specific to each source category on methods for calculating adjustments. During these sectoral group sessions, participants were asked to identify, for each of the source-categories of the respective sector:

(a) Those methodologies, including possible drivers, which are applicable for making adjustments and, where appropriate, those which may be most suitable, and

(b) Elements to be used to ensure that the adjusted estimates are conservative.

In addition, each group identified areas in which further work to improve the technical guidance on adjustments of a given sector and its application would be needed. Upon completion of the workshop, the recommendations of each sectoral working group, as discussed during the last plenary session of the workshop, were incorporated by the secretariat, under the guidance of the co-chairmen assisted by the co-facilitators, into the draft technical guidance included in the annex to this note.

III. CONCLUSIONS

13. The participants endorsed the draft technical guidance on methodologies for adjustments as elaborated during the workshop. They recommended its consideration, endorsement and completion, if needed, by the SBSTA at its eighteenth session for consideration by the COP at its ninth session, with a view to recommending such technical guidance for adoption at that session by the COP/MOP, as mandated by decision 21/CP.7.

14. The participants recommended simulating the calculation of adjustments by using the methods included in the draft technical guidance on the basis of actual inventory data submitted by Parties in the years 2000 and 2001 and reviewed during the technical review of GHG inventories. This would allow the preparation and assessment of case studies using actual inventory data, which the participants suggested be undertaken by the secretariat. The results from these studies, including their assessment, might contribute to a further refinement of the draft technical guidance to be forwarded by the SBSTA[8] for consideration by the COP at its ninth session.

15. The participants recommended that the secretariat should organize a second workshop, in keeping with the mandate of decision 21/CP.7 (see paragraph 1 above), on methodologies for adjustments under Article 5, paragraph 2, to take place in the first quarter of the year 2003. The purpose of that workshop would be an assessment by the inventory experts and experts participating in the workshop of the case studies of simulated adjustments as described in paragraph 14 above.

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should be developed immediately after completion of the work of the IPCC on good practice guidance on land use, land-use change and forestry.

[8] It is envisaged that consideration of this matter by the SBSTA will take place at its eighteenth session.

16. The participants anticipated that the assessment described in paragraphs 14 and 15 above would not lead to substantial changes in the draft technical guidance elaborated at the Athens workshop and contained in the annex to this note. It is likely that the results of the assessment will help to ensure a more consistent application of adjustments by the different expert review teams. However, if the results of the assessment indicate that some methods in the draft technical guidance do not lead to the adjustments as envisaged in the draft CMP.1 decision attached to decision 21/CP.7, or that the adjusted estimates do not seem to be appropriate, the process as envisaged would allow final corrections to be made to the draft technical guidance, including to the methods described therein, in order to ensure that adjustments would be calculated appropriately. The experts participating at the second workshop may recommend such corrections for consideration by the SBSTA at its eighteenth session.

17. In addition, participants identified a number of areas for future work that might also be undertaken by national inventory experts prior to the second workshop, namely: the creation of a basis for "clustering" of GHG estimates or other relevant data from countries with similar national circumstances, the compilation of sector-specific information on how to use interpolation/extrapolation methods in some sectors and how these methods result in conservative estimates, the identification of relevant data in international literature, the identification of appropriate drivers, for example for F-gases in the industrial processes sector and for biomass used as energy, and the development of further work on the application of the reference approach as an adjustment method for the fuel combustion subsector (taking into account that a missing CO_2 estimate for the whole fuel combustion sector is unlikely). The participants suggested that the outcome of such work should be shared with experts from other Parties.

Annex

DRAFT TECHNICAL GUIDANCE ON METHODOLOGIES FOR ADJUSTMENTS UNDER ARTICLE 5, PARAGRAPH 2, OF THE KYOTO PROTOCOL[9]

I. OBJECTIVE

1. The objective of this technical guidance on methodologies for adjustments under Article 5, paragraph 2, is to ensure that adjustments are applied consistently,[10] comparably and transparently, and that similar methods are used for similar problems as far as possible across all inventories reviewed under Article 8.

2. The application of the adjustments is guided by the operative paragraphs 3 to 11 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2), included in decision 21/CP.7.[11]

II. GENERAL APPROACH

3. The expert review teams, under their collective responsibility, shall, if needed, calculate and document adjustments as part of the individual review reports, following this technical guidance.

4. Adjustments are intended to correct inventory problems for the purpose of accounting emission inventories and assigned amounts of the Parties included in Annex I to the Convention (Annex I Parties), in accordance with paragraphs 8 and 9 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2). If the expert review team finds that an estimate is not prepared in accordance with the Intergovernmental Panel on Climate Change (IPCC) Guidelines[12] as elaborated by the IPCC good practice guidance,[13] but evidently does not lead to an overestimation of emissions in the base year or an underestimation in a year of the commitment period, the estimate does not have to be adjusted.

5. Adjusted estimates should be conservative for the Party concerned in order to ensure that, for the base year(s), emissions[14] are not overestimated and removals are not underestimated and, for a year of the commitment period, emissions are not underestimated and removals are not overestimated.

6. This guidance is not comprehensive and may not cover all possible problems. If some aspects of a particular case are not covered by this guidance, the experts calculating the adjustment shall adhere to paragraphs 3 to 11 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2) and, as closely as possible, to this guidance.

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[9] All articles referred to in this guidance are those of the Kyoto Protocol. For the sake of brevity, the Kyoto Protocol is not specified after each article.

[10] The need to ensure that adjustments are conservative as stated in the CMP decision on this matter (see paragraph 5 of the draft decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2), could result in inconsistency in the time series between the base year and the commitment period.

[11] See FCCC/CP/2001/13/Add.3.

[12] For the purpose of this document, the term *IPCC Guidelines* denotes the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

[13] For the purpose of this document, the term *IPCC good practice guidance* denotes the IPCC Report on Good Practice Guidance and Management of Uncertainty in National Greenhouse Gas Inventories.

[14] For the purpose of this document, estimates of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol are referred to as emissions and removals, respectively.

7. The expert review teams should strive to apply a simple approach, given the limited time available for the calculation of adjustments.[15] Accordingly, the expert review teams may use country-specific data available from other sources, giving preference to the consideration of data coming from national statistics, but they should avoid generating new country-specific data, for example by conducting surveys.

III. METHODS

A. Choice of methods and parameters

8. If the problem concerns only one inventory year (e.g. calculation mistake for a single year) and one component of a given estimate (such as inconsistent, incorrect or misapplied emission factors, activity data or model parameters), only this year or component should be replaced in order to adjust the emission estimate.

9. Expert review teams should decide which methods and parameters are appropriate for a specific case based on this guidance. The experts should follow the general recommendations given in this section, unless otherwise indicated in the sector-specific guidance in section IV. In following these recommendations it is necessary to be aware that the order in which methods are presented (see paragraphs 12–17 and table 1 below) does not represent a ranking of the methods to be used.

10. The decision on the method shall take into account:

(a) The availability of country-specific data in the source category at the respective level of aggregation that is required by the methods. Collection of new country-specific data by the experts should be avoided;

(b) The uncertainties of the available data;

(c) Relevant national circumstances affecting emissions or removals in the respective source category

(d) The sector-specific guidance in section IV as indicated in paragraph 9 above

11. If for any given year of the time series an estimate was missing or not prepared in a way consistent with the IPCC Guidelines as elaborated by the IPCC good practice guidance, thus resulting in an inconsistency in the submitted time series of a given source category, only those estimates, or the components of them, which lead to the discontinuity should be adjusted. If the same problem occurs in more than one year, all of the adjusted estimates should be conservative.

12. If an emission estimate is missing, the methods listed below may be applied:

(a) Interpolation, if an estimate is available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if an estimate is available and reviewed for subsequent or previous years (see method B below)

(c) Application of IPCC tier 1 and/or default methods, if such a method, default emission factor or other necessary data are available (see method G below)

(d) Extrapolation using an appropriate driver (see method C below)

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[15] For provisions regarding timing under the review under Article 8, see paragraph 3 of the appendix to this guidance.

(e) Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver (see method H below)

(f) Linkages of emissions between gases or sources (see method I below)

These methods would also be applied in those cases in which adjustments were triggered as a result of lack of transparency, if this lack of transparency precludes the expert review team from assessing whether the estimate is an overestimation of emissions in the base year or an underestimation of emissions in the years of the commitment period.

13. To replace an emission factor or other parameter that was calculated in a way not compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, the following methods could be used:

(a) Interpolation, if a parameter is available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if a parameter is available and reviewed for subsequent years or previous years (see method B below)

(c) Application of the IPCC default values or a conservative choice within the range given by the IPCC Guidelines (see method E below)

(d) Application of an average parameter for a cluster of countries with comparable national circumstances (see method F below)

(e) Application of values given in other recognized sources, such as international databases[16] (see method D below), or

(f) Application of values from a cluster of countries with similar national circumstances (see method H below)

14. To replace activity data that were not collected in a way compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, the following methods could be applied:

(a) Interpolation, if data are available and reviewed for both prior and subsequent years (see method A below)

(b) Extrapolation, if data are available and reviewed for subsequent or previous years (see method B below)

(c) Application of data from recognized national or international sources, such as international databases (see method D below)

15. To adjust estimates that were calculated using a method not compatible with the IPCC Guidelines as elaborated by the IPCC good practice guidance, or where a method is applied incorrectly, the following methods could be used:

(a) Application of IPCC tier 1 and/or default methods, if an IPCC tier 1 method, a default emission factor, activity data from national or international sources, or other necessary data are available (see method G below)

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[16] The IPCC emission factor database is under development.

(b) Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver (see method H below)

(c) Linkages of emissions between gases or sources, if applicable (see method I below)

16. Problems of the allocation of emissions to the wrong source category should be addressed by the reallocation of these emissions to the correct source category. In this case, adjustments should be applied only if such reallocation affects total emissions of sources included in Annex A of the Kyoto Protocol or removes double counting of removals.[17]

17. For lack of full coverage of sub-sources within a source category, or lack of full geographic coverage, the same methods that are recommended for a missing estimate should be applied (see paragraph 12).

Table 1. Summary of the main reasons and available methods for adjustments[18]

Methods	*Missing estimate* [a]	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			
		Emission factor or other parameter inappropriate	Activity data inappropriate	Method inappropriate	Allocation to inappropriate source category
A. Interpolation of emission estimates or parameters	X	X	X		
B. Extrapolation of emission estimates or parameters	X	X	X		
C. Extrapolation of emissions using drivers or surrogate data	X				
D. Application of data from international databases		X	X		
E. Application of IPCC default values		X			
F. Application of an average parameter for a cluster of countries		X			
G. Application of IPCC tier 1 and/or default methods	X			X	
H. Emission estimation using an average emission rate for a cluster of Annex I Parties and a country-specific driver	X	X		X	
I. Linkages of emissions between gases or source categories	X			X	
J. Reallocation of the emissions to the correct source category					X

[a] The same methods apply to lack of full geographic coverage.

B. Further details on the general methods

18. In the following section, the requirements for application of the methods mentioned in the above section are further described:

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[17] If such reallocation does not affect total emissions of sources included in Annex A of the Kyoto Protocol, reallocation is recommended to the Party, but no adjustment is necessary.

[18] The table summarizes generally applicable methods as specified in paragraphs 12 to 17. "X" indicates those methods that would be applicable for a given problem to be adjusted. In the sector-specific guidance, however, some methods not marked in this table were identified as applicable (see section IV).

A. Interpolation of emission estimates or parameters is applicable where reviewed values of the years adjacent to the year in question are available. Guidance on interpolation as provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if interpolation is used.

B. Extrapolation of emission estimates or parameters is applicable if inventory data are missing for the beginning (base year) and/or the end (most recent year) of the time series, and reviewed values are available for some years. The experts should thoroughly analyse data for available years to determine the functional form of the extrapolation chosen, and report the number of existing values considered to derive the extrapolated estimate, as well as year-to-year fluctuations in previous years and the assumptions made in calculating the extrapolation. Guidance on trend extrapolation provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if this method is used.

C. Extrapolation of emissions using drivers or surrogate data can be applied if emission estimates for the source category are available for the Party for some years but are missing for the required year. The emissions need to be strongly correlated with other well-known and more readily available indicative data. Experts shall demonstrate and report the significance of the relationship of the drivers used to calculate a missing estimate, including the year-to-year fluctuations, and shall report the assumptions made to calculate the extrapolation. Guidance on surrogate methods provided in the IPCC good practice guidance, section 7.3.2.2, should be followed if this method is used.

D. Application of data from international databases could be used to replace activity data or other parameters. If international data are used, the exact source and the date of retrieval should be reported. Whether or not the geographical coverage of the database corresponds to the country's geographical definition used for reporting under the UNFCCC should be checked. A brief description of how the international source collects its data, which definitions are used and how this data compares with any data directly provided by the Party should be provided by the expert review team. Sources of such data for the different sectors are listed in section IV.

E. Application of IPCC default values or a conservative choice within the range provided by the IPCC could be used to replace a deficient emission factor. For the default emission factors, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. If a factor is chosen, the experts should report how the chosen default emission factor reflects national circumstances in a conservative manner.

F. Application of an average parameter for a cluster of countries with comparable national circumstances for a given source category could be used to correct a deficient parameter of the Party in question. Comparable national circumstances could relate to, *inter alia*, design, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features. Assumptions made for the composition of the cluster should be reported, as well as how this average parameter compares with the default parameter or range provided in the IPCC Guidelines. Such clusters should include only Annex I Parties that have undergone review and for which no adjustments were applied to the parameter concerned.

G. IPCC tier 1 and/or default methods could be applied if an emission estimate is missing entirely. For such estimation, recognized national or international activity data and IPCC default emission factors are to be used. For these methods, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. IPCC tier 1 methods should be applied if reliable activity data for these methods are available and if a default emission factor is available reflecting in a conservative manner the national circumstances of the Party concerned. All assumptions made in calculating emissions using IPCC tier 1 methods should be reported.

H. Emission estimation using an average emission rate of a cluster of Annex I Parties and a country-specific driver can be used if an emission estimate is missing entirely but data for a parameter driving emissions from that source are available for the country in question. The estimate is derived by establishing a relationship between emissions and an appropriate driver for the cluster of countries with comparable national circumstances, and applying this relationship to the Party in question. Such clusters should include only Annex I Parties that have undergone review and for which no adjustments were applied to the parameter concerned. Comparable national circumstances for the source category concerned could, for example, relate to design, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features. Assumptions made for the composition of the cluster and the established relationship should be reported.

I. Linkages of emissions between gases or source categories could in some cases be used to estimate emissions from a specific gas or source category. For example, CH_4 and N_2O emissions for fuel combustion activities could be calculated from CO_2 emissions, if available. When this approach is used, the experts should carefully assess whether such a relationship between gases exists for the source category concerned. Examples are given in section IV.

J. Reallocation of emissions to the correct source category can be used when a wrong allocation of a given source category affects total emissions of sources included in Annex A of the Kyoto Protocol or removes double counting of removals.[19]

C. Other matters

1. Conservative approach
(see also examples in appendix I)

19. The selection of methods, activity data, emission factors or any other parameter, as appropriate, relevant to the estimation of adjustments to GHG emissions, should produce conservative estimates. These conservative estimates are produced taking into consideration that adjustments are likely to be applied on an exceptional basis[20] and are likely to have a temporary character.[21]

20. To ensure that emission estimates are conservative as defined in paragraph 5 above, the final adjusted estimate should be (for emissions in the base year or removals in a year of the commitment period) in general in the 25th percentile and (for removals in the base year or emissions in a year of the commitment period) in the 75th percentile of the 'possible range'. Such 'possible range' could be approximated by assessing:

(a) The range of emission estimates obtained using the range of one or several input parameters; in particular those provided by the IPCC good practice guidance;

(b) The range of emission estimates obtained using different methods; or

(c) The range of uncertainty around a point estimate from uncertainty data available from other Annex I Parties.

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[19] If such reallocation does not affect total emissions of sources included in Annex A of the Kyoto Protocol, reallocation is recommended to the Party, but no adjustment is necessary.

[20] In accordance with paragraphs 74 and 80 (b) of the guidelines for review under Article 8, Parties might provide revised estimates for any inventory problem that the expert review team indicates needed adjustment.

[21] In accordance with paragraphs 81 and 82 of the guidelines for review under Article 8, a Party has the opportunity to provide a revised estimate for a part of its inventory for a year of the commitment period in order to substitute an adjustment estimate.

21. Expert review teams may also make conservative point estimates based on conservative parameters. In selecting conservative parameters for this purpose, expert review teams should aim to produce final adjusted estimates for the base year and commitment period consistent with the provisions and percentile ranges set out in paragraphs 19 and 20 above.

22. The experts should provide evidence in specific cases for why the chosen adjustment is seen as conservative.

2. Procedures

23. When calculating adjustments in the context of the review under Article 8, if necessary, expert review teams shall follow the relevant provisions of the guidelines under Article 8.[22]

3. Reporting

24. When reporting on adjustments in the context of the review under Article 8, expert review teams shall follow the relevant provisions of the guidelines under Article 8.[23]

4. Archiving

25. The secretariat shall archive all information relating to adjustments and make it available to all expert review teams to enable them to apply adjustments, if needed, consistently across countries.

IV. SECTOR-SPECIFIC GUIDANCE

A. Energy: 1.A Fuel combustion activities

1. General characteristics of the subsector

26. Emission estimates from fuel combustion activities are based on national energy statistics. There are generally two approaches for estimating emissions due to fuel combustion activities. The reference approach calculates the total CO_2 emissions from the combustion activities of all fuels used. This approach estimates apparent consumption of fuels in the country on the basis of figures for production of primary fuels and imports, exports and stock changes of all fuels. In the sector-specific approach, emissions are calculated for each specific source category on the basis of fuel consumption in that given source category. In the case where data are not available at sector level, internationally available energy data can be used to calculate sector-specific emissions.[24] While the sector-specific approach generally provides more accurate sector emissions, it may not contain estimates for all sectors.

27. Only emissions from domestic shipping and air transport are included in the total national emissions. Often it can be difficult to distinguish the domestic activities from the international ones. The IPCC good practice guidance gives guidance as to how the split between the domestic and international parts of these emissions can be assessed. The domestic fraction of fuel used could be assessed using data from other countries with similar circumstances. Information on fuel used for domestic and international transportation can be obtained from international sources (such as the International Energy Agency (IEA)). However, the quality of this information should be assessed before being used.

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[22] A compilation of the relevant paragraphs from the guidelines under Article 8 on this matter is included as an appendix to this guidance (appendix II).

[23] A compilation of the relevant paragraphs from the guidelines under Article 8 on this matter is included as an appendix to this guidance (appendix II).

[24] This option is described in working paper 3(a) (2000), which can be found on the secretariat's web site (http://unfccc.int/sessions/workshop/000314/).

2. Methods applicable or not applicable to this subsector

28. In the unlikely event that total CO_2 emission estimates from the sectoral approach are missing, then the reference approach should be used for any adjustment, if possible. Note that the reference approach may not give conservative estimates, as explained in paragraph 34 below. If a country has insufficiently accurate energy data, and the energy data is not available from recognized international sources, no appropriate adjustment method will be suitable.

29. If CO_2 emissions from some subsectors/source categories are missing from the total CO_2 estimates, adjustments can be made by using the options mentioned in table 2, taking into account the need to produce a conservative estimate. For most countries it is normally preferable to use activity data from international statistics and IPCC default emission factor values. It is also possible to apply average parameters derived from a cluster of countries. If other options are not applicable, extrapolation, preferably using drivers, can be used in cases where recent data are missing but for a limited number of years. Although it is possible to use an average Annex I emission rate and a country-specific driver, this is not generally recommended.

30. The fuel totals are generally better known than the fuel consumption in the different sectors. If adjustments are made to individual subsectors, care should be taken that the total CO_2 emissions are in accordance with the total fuel uses if these are known.

31. If CH_4 and N_2O emissions are missing, adjustments can be made by using the options mentioned in table 2, taking into account the need to produce a conservative estimate. If CH_4 and N_2O estimates are missing, and CO_2 emissions are not available at subsector level, it is recommended that the aggregated fuel data be disaggregated into the consuming subsectors and the results used to estimate CH_4 and N_2O emissions using emission factors from a cluster of countries with similar circumstances. If this is not appropriate, the IPCC default emission factors could be used. Extrapolation should be used with care due to possible changes in technologies or performance standards.

32. Activity data on biofuel combustion needed to calculate CH_4 and N_2O emissions may be lacking, or be of questionable quality, in both national and international datasets. It is also generally difficult to define suitable drivers for adjusting such missing emissions. If data are available for at least one year, extrapolation using drivers can be used. If data are not available for any year, data from other countries can be used in cases where national circumstances, including policies, are comparable.

33. If CH_4 and N_2O estimates are missing, and CO_2 emissions are available for each subsector, in addition to the options above it is possible to use an average ratio between CH_4 and CO_2 emissions, as well as an average ratio between N_2O and CO_2 emissions, for all Annex I countries or a cluster of countries.[25]

3. Conservative approach in the fuel combustion subsector

34. There is a particular challenge in ensuring that adjusted estimates are conservative when using the CO_2 estimates from the reference approach to make adjustments. A conservative approach should be ensured particularly when estimating carbon stored. Uncertainties are usually not available for the reference approach, and it is not feasible to consider ranges in data, since a large number of parameters enter the calculation.

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[25] This option is described in working paper 3(b) (2000), which can be found on the secretariat's web site (http://unfccc.int/sessions/workshop/000314/).

able 2. Sector-specific adjustment methods applicable to the fuel combustion subsector

Source category: **1.A Fuel combustion (all source categories) — CO_2, CH_4 and N_2O**	*Missing estimate*	*Not prepared in accordance with the IPCC Guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate/missing	Activity data nappropriate/ missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] Unlikely to be needed for CO_2. [b] More likely to be needed for CH_4 and N_2O.
B. Extrapolation of emission estimates or parameters	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] For CO_2, extrapolation can be recommended (e.g. delay in final energy data). Other options are, however, preferable. [b] For CH_4 and N_2O, extrapolation can be recommended, but care has to be taken in its application, as technology has to be taken into account.
C. Extrapolation of emissions or parameters using drivers or surrogate data	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]	CO_2 [a] CH_4 & N_2O [b]		[a] For CO_2, this method is preferable to A and B. [b] Extrapolation can be recommended, but care has to be taken in its application as technology has to be taken into account.
D. Application of data from international databases	CO_2 CH_4 & N_2O [b]	CO_2 CH_4 & N_2O [b]	CO_2 CH_4 & N_2O [b]		*This would be part of the tier 1 method.* [b] For CH_4 and N_2O emission factors, the IGES or any other databases (e.g. IPCC emission factor database) could be used.
E. Application of IPCC default emission factor value	CO_2 CH_4 & N_2O [b]	CO_2 CH_4 & N_2O [b]			*Application of IPCC default emission factor values would be part of the tier 1 method.* [b] For CH_4 and N_2O, special consideration has to be given to ensure that estimates are conservative.
F. Application of an average parameter for a cluster of countries	CO_2 CH_4 & N_2O [b]	CO_2 CH_4 & N_2O [b]			[b] Preferable to tier 1.
G. Application of IPCC tier 1 methods	CO_2 CH_4 & N_2O			CO_2 CH_4 & N_2O	
H. Emission estimation using an average Annex I emission rate and a country-specific driver	CO_2 CH_4 & N_2O	CH_4 & N_2O	CH_4 & N_2O	CH_4 & N_2O	Not highly recommended.
I. Linkages of emissions between gases or source categories	CH_4 & N_2O	CH_4 & N_2O			Appropriate ratios for CH_4 and N_2O can be established using CO_2 estimates. The UNFCCC GHG database could be used for this purpose.

Note: This table covers all sub-sources from the fuel combustion sector. Unlike in the sector-specific tables in this guidance, the indication of applicability of the different methods is indicated by gas rather than by source categories.

If better information is not available, it is recommended that an uncertainty of ±15 per cent be assumed as the basis of a conservative assessment and also the rules outlined in paragraph 20 (adjust the estimate down by 7.5 per cent in base year and up by 7.5 per cent in commitment period if applicable).

35. When CO_2 estimates for fuel combustion based on the sectoral approach are used for adjustments, the use of conservative values must be ensured for emission factors and/or energy data, depending on the basis for the adjustment. When the adjustment involves energy data, the uncertainty, if available, should be used to ensure that the estimate is conservative. If uncertainties in energy data are not available for the Party in question or a Party assessed to have energy statistics of comparable quality, the use of an uncertainty of ±15 per cent is recommended as a basis for a conservative assessment (together with the rules outlined in paragraph 20). CO_2 emission factors for most fuels have a low uncertainty, but a conservative approach should be ensured for coal, natural gas and other fuels having a spread in carbon content. The use of ranges in carbon content is recommended, based for example on the IPCC Guidelines.

36. For N_2O and CH_4 from fuel combustion, the same considerations for energy data apply as described in paragraph 35. For emission factors it is recommended that a conservative approach be ensured through the use of uncertainties as given in the IPCC good practice guidance, ranges in emission factors given in the IPCC Guidelines or ranges in implied emission factors from a cluster of countries with similar circumstances (together with the rules outlined in paragraph 20). It is particularly important to ensure that adjustments are conservative for emissions of N_2O that can be increasing, for example for road transport.

4. Relevant international sources of activity data and possible drivers

37. For adjustment methods taking activity data into consideration, the following international activity data available from the following sources can be used:

(a) United Nations Statistics Division

(i) Industrial Commodity Statistics Yearbook

(ii) Monthly Bulletin of Statistics

(b) International Energy Agency (IEA)

(c) European Commission, Directorate General for Energy: Annual Energy Review (covers Annex I and non-Annex I Parties)

(d) Eurostat (for Europe)

(e) Food and Agricultural Organization of the United Nations (for biofuels)

38. For extrapolations (method C), drivers as given in table 3 could be used. Drivers at the macroeconomic level are usually better correlated to relatively aggregated emissions than to subsector-specific emissions.[26] Expert review teams should first refer to national statistical data for use as a driver. If national data are not available, the international sources listed in table 3 could be used to obtain this information.

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[26] This option is described in working paper 3(c) (2000), which can be found on the secretariat s web site (http://unfccc.int/sessions/workshop/000314/).

Table 3. Drivers for emissions from fuel combustion activities

Source category	Possible drivers	International data sources
1.A.1 Energy industries	Gross domestic product (GDP)	Organisation for Economic Co-operation and Development (OECD), World Bank
1.A.1.a Public electricity and heat production	GDP Public electricity production/output	OECD, World Bank United Nations, IEA, EUROSTAT, UNIPEDE
1.A.1.b Petroleum refining	Crude oil throughput Other production data (if available) GDP(last resort)	United Nations, IEA, EUROSTAT OECD, World Bank
1.A.2 Manufacturing industries and construction	Production data (iron, steel, etc.) (highly recommended) Production index Value added GDP(last resort)	United Nations, OECD, EUROSTAT, CEMBUREAU (for cement) OECD, World Bank
1.A.3 Transport		
1.A.3.a Civil aviation	Number of landings and take offs Transport performance (passenger km, tonnes km)	ICAO, EUROSTAT
1.A.3.b Road transportation	Transport performance (passenger km, tonnes km, vehicle km) Number of car registrations (last resort)	EUROSTAT
1.A.3.c Railways	Transport performance (passenger km, tonnes km)	EUROSTAT
1.A.3.d Navigation	Transport performance (passenger km, tonnes km)	EUROSTAT
1.A.4 Other sectors		
1.A.4.a Commercial/institutional	Number of m^3 or m^2 of buildings [Employees] Degree days	
1.A.4.b Residential – CO_2	Population Number of households Income (in $) Consumption (in $) Degree days	United Nations, OECD, EUROSTAT
1.A.4.b Residential – CH_4, N_2O	Bio-energy (crop/fuel wood production data)	FAO, (IEA)
1.A.4.c Agriculture/forestry/fisheries	Value added	OECD, World Bank, EUROSTAT

B. Energy: 1.B Fugitive emissions from fuels

1. General characteristics of the subsector

39. Fugitive emissions from fuels are divided into two main source categories:

(a) Solid fuels - This category is subdivided into fugitive methane emissions from coal mining and handling and that from solid fuel transformation. Fugitive emissions resulting from other solid fuels, such as peat, can be treated using the same adjustment principles as for coal.

(b) Oil and natural gas - This category accounts for all direct GHG emissions, except those from fuel combustion, which may be attributed to oil and gas exploration, production, processing/refining, transmissions or final distribution activities. For reporting purposes, the category is

subdivided into three categories: fugitive emissions from gas systems, fugitive emissions from oil systems, and venting and flaring emissions from oil and gas systems.

2. Methods applicable or not applicable to this subsector

40. If CH_4 emissions from some subsectors/source categories are missing, adjustments can be made by using the options mentioned in table 4 for coal mining and oil and gas systems, taking into account the need to produce a conservative estimate.

41. For coal mining, the preferred option is to use activity data from national or international sources and the IPCC default method and emission factors, taking care to ensure that the estimate is conservative. It is possible to use forward extrapolation for a limited number of years. Backward extrapolation should be used with care due to changes in technology and performance standards. In principle, the use of an average parameter for a cluster of countries is applicable, but this would need to take into account the technology or type of mines. In particular, it is important to distinguish between surface and underground mines. Although this information is not generally published in international sources, it may be obtained (for some countries) through special requests to international statistical organizations (e.g. IEA).

42. For the oil and gas subsector, the methodologies require a large amount of data that are usually unavailable. It is generally difficult to make adjustments at the level of higher tier methods. In general, interpolation and extrapolation are not applicable at a tier 1 level due to changes in technology and performance standards, but could be applied at a disaggregated level. It is recommended that national energy production and refinery statistics are used to interpolate or make moderate extrapolations of emission estimates already available for a given country. However, extrapolation or interpolation between countries is not recommended. If adjustments are to be made for one or more source categories, the preferred option is to use data from national or international sources together with the IPCC default method and emission factors, taking care to ensure that the estimate is conservative.

3. Conservative approach in the fugitive emissions subsector

43. For adjustments in fugitive emissions from energy production, storage and distribution, a conservative approach should be ensured, preferably through the use of uncertainties as given in the IPCC good practice guidance and the rules outlined in paragraph 20. Ranges in default emission factors given in the IPCC Guidelines can also be used, but this is a less preferred option.

4. Relevant international sources of activity data and possible drivers

44. For adjustment methods taking activity data into consideration, the following international activity data on production of fossil fuels, available from the following sources, can be used:

(a) United Nations Statistics Division:

(i) Industrial Commodity Statistics Yearbook

(ii) Monthly Bulletin of Statistics

(b) International Energy Agency

(c) Oil and Gas Journal

(d) Eurostat (for Europe)

Table 4. Sector-specific adjustment methods applicable to the fugitive fuel emissions sector

Source category: **1.B.1 Solid fuels – CH_4** **1.B.2 Oil and natural gas – CH_4**	*Missing estimate*	*Not prepared in accordance with the IPCC Guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate/missing	Activity data inappropriate/ missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	1.B.1	1.B.1 1.B.2 [a]	1.B.1 1.B.2 [a]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] In general not applicable at a higher level of aggregation, but could be applied at a disaggregated source category level.
B. Extrapolation of emission estimates or parameters	1.B.1 [a]	1.B.1 [a] 1.B.2 [b]	1.B.1 [a] 1.B.2 [b]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] Forwards extrapolation acceptable, but care needed for backward extrapolation. [b] In general not applicable at a higher level of aggregation, but could be applied at a disaggregated source category level.
C. Extrapolation of emissions (or parameters for 1.B.1) using drivers or surrogate data	1.B.1 [a]	1.B.1 [a] 1.B.2 [b]	1.B.1 [a] 1.B.2 [b]		[a] In principle applicable, but activity data necessary for identifying which drivers should be available in the first place. [b] In general not applicable at a higher level, but could be applied at a disaggregated level.
D. Application of data from international databases	1.B.1 1.B.2 [b]	1.B.1 1.B.2 [b]	1.B.1 1.B.2 [b]		[b] In general, data for venting and flaring are not of as high quality as those reported to IEA.
E. Application of IPCC default emission factor value	*1.B.1* *1.B.2*	*1.B.1* *1.B.2*			
F. Application of an average parameter for a cluster of countries	1.B.1 [a] 1.B.2 [b]	1.B.2 [b]			[a] In principle applicable, but it would be necessary to take into account the technology or types of mines. Other options are preferable. [b] In principle applicable, for certain clusters of countries with similar circumstances, but technology differences need to be taken into account.
G. Application of IPCC tier 1 methods	1.B.1 1.B.2			1.B.1 1.B.2	
H. Emission estimation using an average Annex I emission rate and a country-specific driver					
I. Linkage of emissions between gases or source categories					

45. There are limited cases where the use of drivers (method C) is possible in this sector. When needed for adjustment purposes, expert review teams should first refer to national statistical data for use as a driver. In some cases, national production data can be considered as a driver. Other appropriate drivers are more difficult to obtain. If national data are not available, this information could be obtained from the international sources listed in table 5.

Table 5. Drivers for fugitive emissions from fuels

Source category	Possible drivers	International data sources
1.B.1 Solid fuels	No drivers (other than production data) are recommended	
1.B.2 Oil and natural gas	Well counts Number of wells drilled Crude oil throughput (for refineries) Facility counts Pipeline breaks and well blow-outs Pipeline lengths Per capita statistics (population, consumption of natural gas)	*Oil and Gas Journal*, United Nations, OECD, IEA, EUROSTAT

C. 2 Industrial processes

1. General characteristics of the sector

46. GHG emissions are produced from a variety of industrial activities which are not related to energy.[27] The main emission sources are industrial production processes which chemically or physically transform materials. During these processes, many different GHGs, including CO_2, CH_4, N_2O, HFCs and PFCs, can be released. Cement production is a notable example of an industrial process that releases a significant amount of CO_2. Different halocarbons (and SF_6) are also consumed or produced in industrial processes or used as alternatives to ozone depleting substances (ODS) in various applications.

2. Methods applicable or not applicable to this sector

47. Tables 6 and 7 below list all methods that could be used to apply adjustments in the industrial processes sector. When applying adjustments in this sector, consideration needs to be given to any information available regarding technology characteristics of the source category (such as the existence of abatement technology).

48. If estimates from any source category are missing, the most appropriate methods for making an adjustment are, in general, either to apply the IPCC tier 1 method or to use data from international databases (which also applies in the case where activity data are found to be inappropriate), since in most cases the reason for a missing estimate would very likely be a lack of data. However, data from international sources may be difficult to obtain, depending on the source category.

49. Alternatively, emission estimates could be extrapolated or interpolated, but preference should be given to extrapolation using drivers or surrogate data (method C), as this approach is likely to reflect actual trends more closely. In selecting appropriate drivers (see table 8 below for possible drivers), preference should be given to energy data provided as part of the submitted inventory, where available. Energy data would be relevant, for example, for cement, iron and steel, and aluminium production. Where appropriate energy data for iron and steel and aluminium production are not available, pig iron production and aluminum production data might be equally suitable drivers.

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[27] The guidance in this section assumes that the sectoral approach has been applied in the energy sector. The expert review team should also note the possibility of double counting (for instance, the use of lime in iron and steel production).

3. Conservative approach in the industrial processes sector

50. A conservative approach in many industrial processes source categories (such as production of nitric and adipic acid, iron and steel, ammonia, aluminium) can be ensured by choosing a conservative emission factor from a range of possible values. The following should be taken into account in applying a conservative approach to a range of emission factors:

(a) For nitric acid production: If no information is available to support the choice of the emission factor, a factor based on older production processes should be assumed.

(b) For adipic acid production: The non-abatement range as given in the IPCC good practice guidance (300 Kg/t +/- 10 per cent) should be used.

(c) For ammonia production: The ranges as given in the IPCC Guidelines should be used.

(d) For iron and steel production: The value from the IPCC Guidelines (1.6) for production data should be used and the uncertainty range for emission factors for reducing agents (in the IPCC good practice guidance generally +/- 5 per cent) should be applied; any information on uncertainty of activity data should be considered.

(e) For PFCs from aluminium production: The range given in the IPCC good practice guidance should be taken and a conservative approach applied; the range is large but still applicable.

51. For HFC, PFC and SF_6 estimates from the consumption of halocarbons and SF_6, conservative estimates can be produced by choosing conservative values from a range of other relevant parameters, such as uncertainty for sales figures (e.g. foam blowing) and other parameters (such as composition of the mix in coolant) as given in the IPCC good practice guidance.

52. For some sources, such as cement production, neither a range of emission factors nor other relevant parameters can be used for applying a conservative approach, as such ranges do not exist. In these cases, the approach described in paragraphs 53 and 54 below could be applied.

53. Uncertainty is an element that can be used consistently in the industrial processes sector to apply a conservative approach. The uncertainty range around a point estimate from uncertainty data available from the following sources can be used to make the adjusted estimates conservative:

(i) Other Annex I Parties

(ii) Other Annex I Parties with similar circumstances

(iii) Statistical analysis of the national trend (variability of the data, regression analysis, etc.), applicable to all cases of interpolation and extrapolation

(iv) The same country in the previous year

54. For cement and ammonia production, the use of the uncertainty range from the Party's previous years' inventory is the preferred option for making the estimates conservative.

Table 6. Sector-specific adjustment methods applicable to the industrial processes sector – CO_2, CH_4 and N_2O

Source category: **2.A.1 Cement production** **2.B.2 Nitric acid production** **2.B.3 Adipic acid production** **2.B.1 Ammonia production** **2.C.1 Iron and steel production**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/ missing	
A. Interpolation of emission estimates or parameters	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
B. Extrapolation of emission estimates or parameters	2.A.1 2.B.1 2.B.2 & 2.B.3 [a] 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] The expert review team should take note of the possible existence of abatement technology and that nitric acid is not an end product (availability of parameters may be limited).
C. Extrapolation of emissions using drivers or surrogate data	2.A.1 [a] 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 [a] 2.B.1 2.B.2 & 2.B.3 2.C.1		[a] Method C is preferable to A or B as this approach is likely to reflect actual trends more closely.
D. Application of data from international databases	2.A.1 [a] 2.B.1 [b] 2.B.2 & 2.B.3 [c] 2.C.1 [d]		2.A.1 [a] 2.B.1 2.B.2 & 2.B.3 [c] 2.C.1		[a] It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data available from international sources. If data are not up to date then data should be extrapolated on the basis of most recent data. [b] It is preferable to use this method. However, production data from international sources may be difficult to obtain (ammonia is not an end product). If data are not up to date then they should be extrapolated from earlier data. [c] It is preferable to use this method. However, for nitric acid, production data from international sources may be difficult to obtain (nitric acid is not an end product) and often international statistics may report higher values than national statistics. If data are not up to date then data should be extrapolated on the basis of the most recent data. [d] It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.

Table 6. Sector-specific adjustment methods applicable to the industrial processes sector – CO_2, CH_4 and N_2O *(continued)*

Source category: **2.A.1 Cement production** **2.B.2 Nitric acid production** **2.B.3 Adipic acid production** **2.B.1 Ammonia production** **2.C.1 Iron and steel production**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/missing	Method inappropriate/ missing	
E. Application of IPCC default value		2.A.1 [a] 2.B.1 2.B.2 & 2.B.3 [b] 2.C.1			[a] Only one ch as there is no range of emission factors. [b] There are ranges of emission factors. For nitric acid the range is large. The conservative emission factors could be difficult to identify. The expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information those that would result in more conservative results could be selected.
F. *Application of an average parameter* for a cluster of countries	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1		Least preferred option.
G. Application of IPCC tier 1 methods	2.A.1 [a] 2.B.1 [b] 2.B.2 & 2.B.3 [c] 2.C.1 [d]		2.A.1 [a] 2.B.2 & 2.B.3 2.C.1	2.A.1 2.B.1 2.B.2 & 2.B.3 2.C.1	[a] It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data. [b] It is preferable to use this method. However, production data from international sources may be difficult to obtain (ammonia is not an end product). If data are not up to date then they should be extrapolated from earlier data. [c] It is preferable to use this method. However, for nitric acid, production data from international sources may be difficult to obtain (nitric acid is not an end product) and often international statistics may report higher values than national statistics. If data are not up to date then they should be extrapolated on the basis of the most recent data. [d] It is preferable to use this method (as the reason for no estimate is most likely a lack of data). Production data are available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.
H. Emission estimation using an average Annex I emission rate and a country-specific driver					Not recommendable for 2.A.1.
I. Linkage of emissions between gases or source categories					Not recommendable for 2.A.1.
J. Tier 2				2.A.1 [a]	[a] Time consuming. Could only be used in the case where this source is a key source.

Table 7. Sector-specific adjustment methods applicable to the industrial processes sector – HFCs, PFCs and SF_6

Source category: **2.C.3 Aluminium production – PFCs** **2.F Consumption of halocarbons and SF_6 (ODS substitutes) – HFCs, PFCs, SF_6**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/ missing	Method inappropriate/ missing	
A. Interpolation of emission estimates or parameters	2.C.3 2.F [a]		2.C.3 2.F [a]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] This approach can be used for 2.F, if possible; however, data might not be available for any year.
B. Extrapolation of emission estimates or parameters	2.C.3 2.F [a]		2.C.3 2.F [a]		For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. [a] This approach can be used for 2.F, if possible; however, data might not be available for any year.
C. Extrapolation of emissions using drivers or surrogate data	2.C.3 [a] 2.F		2.C.3 2.F		[a] The expert review team should take note of the possible existence of different technologies. (This method should be given priority before using A or B.)
D. Application of data from international databases	2.C.3 [a]		2.C.3 [a]		[a] It is preferable to use this method. Production data available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data.
E. Application of IPCC default value		2.C.3 [a] 2.F [b]			[a] Range of emission factors. The expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information, it could select those that would result in more conservative results. [b] If Party used tier 2 and inappropriate emission factor then default emission factor should be used. The expert review team should check for deviation from good practice guidance to judge appropriateness of emission factors.
F. Application of an average parameter for a cluster of countries	2.C.3 [a] 2.F [b]		2.C.3 2.F		[a] Less applicable. [b] i. relationship with CFCs (phase out - introduction of halocarbons) in other countries. ii. The expert review team could use an HFC-mixed average of other countries.
G. Application of IPCC tier 1 methods	2.C.3 [a]		2.C.3	2.C.3 2.F [b]	[a] It is preferable to use this method. Production data available from international sources. If data are not up to date then they should be extrapolated on the basis of the most recent data. There is a range of emission factors; the expert review team should consider any technology-related information available in its choice of emission factors. In the absence of information, it could select those that would result in more conservative results. [b] Tier 1a (easier than 1b, but 1b is likely to be more conservative).
H. Emission estimation using an average Annex I emission rate and a country-specific driver	2.F		2.F	2.F	
I. Linkage of emissions between gases or source categories	2.C.3 [a]				[a] Linkage between CF_4 and C_2F_6.
J. Tier 2				2.F [a]	For PFCs from aluminium production (2.C.3) this method is not recommended. Tier 2 requires plant-specific data; these are likely to be not available or their compilation is likely to be time consuming. [a] It is only recommended if this source is a key source.

4. Relevant international sources of activity data and possible drivers

55. For adjustment methods taking activity data into consideration, the following international sources can be used: United Nations Industrial Commodity Statistics, International Iron and Steel Institute and the United States Geological Survey.

56. For methods of extrapolation of emissions or parameters based on the use of drivers or surrogate data (method C), as appropriate, drivers as given in table 8 below could be used.

Table 8. Drivers for emissions from the industrial processes sector

Source category	Possible drivers	International data sources
2.A.1 Cement production	Industrial GDP	United Nations
	Total GDP	United Nations
	Population	United Nations
	Sectoral energy use	National (from the energy sector of the inventory)
2.B.2 Nitric acid production	Fertilizer production	
2.B.3 Adipic acid production	Synthetic fibre production	
2.C.1 Iron and steel production	Pig iron production	United Nations, International Iron and Steel Institute
	Sectoral energy use	National (from the energy sector of the inventory)
	Metal production GDP	International Iron and Steel Institute
	Industrial GDP	United Nations
2.C.3 Aluminium production	Aluminium production	United Nations, United States Geological Survey
	Sectoral energy use	National (from the energy sector of the inventory)
	Metal production GDP	International Iron and Steel Institute
	Industrial GDP	United Nations
2.F Consumption of halocarbons and SF_6	CFCs	
	GDP	United Nations
	Population	United Nations
	Energy intensity	United Nations, IEA
2.B.1 Ammonia production	Fertilizer production	

D. 3 Solvents and other product use

(No specific guidance on this sector will be necessary because GHG emissions are relatively small.)

E. 4 Agriculture

1. General characteristics of the sector

57. Emissions from agriculture encompass all GHG emissions from the agricultural sector;[28] main sources include CH_4 emissions from enteric fermentation, CH_4 emissions from manure management, CH_4 emissions from rice production, N_2O emissions from agricultural soils, N_2O emissions from manure management systems, CH_4 and N_2O emissions from savanna burning, and CH_4 and N_2O emissions from agricultural residues burning.

[28] Except fuel combustion (reported under energy), sewage emissions (reported under waste) and CO_2 emissions from soils (reported under land-use change and forestry).

2. Methods applicable or not applicable to this sector

58. Where an adjustment of an agricultural estimate has to be made, the IPCC tier 1 method, together with IPCC default emission factors, if needed, can be applied for all source categories, provided that activity data as input are available. International data sources (FAO and others, see table 9), are an important source for obtaining missing activity data; however, data on burning are scarce.

59. Alternatively, interpolation/extrapolation could be used in all cases, including interpolation/extrapolation of emission estimates, activity data, emission factors or any other relevant parameters, depending on the circumstances. These should always be based on trend analysis, and, when applying extrapolation, year-to-year fluctuations need to be considered. Interpolation/extrapolation methods based on drivers or surrogated data are not an option for making adjustments in the agriculture sector.

60. Other alternatives for preparing an adjusted estimate are listed in table 9 below.

3. Conservative approach in the agriculture sector

61. Conservative estimates in the agriculture sector can be produced for many source categories by choosing a value from a range of emission factors. The source categories for which this is applicable are:

(a) CH_4 from enteric fermentation (for emission factor ranges see page 4.27 of the IPCC good practice guidance);

(b) N_2O from manure management, where the emission factor EF3 is likely to dominate the uncertainty of the estimates (for ranges of EF3 see table 4.12 of the IPCC good practice guidance);

(c) CH_4 from rice cultivation (for emission factor ranges see page 4.82 of the IPCC good practice guidance);

(d) Indirect N_2O emissions from agricultural soils (for emission factor ranges see page 4.75 of the IPCC good practice guidance).

62. For direct N_2O emissions from agricultural soils, conservative estimates could be obtained using ranges for relevant parameters relating to crop residues, as given in the IPCC good practice guidance (see table 4.16).

63. Uncertainty ranges around point estimates could always be applied for obtaining conservative estimates within the agriculture source categories, provided the uncertainty data are from countries with similar national circumstances. In addition, uncertainty data from other Annex I Parties could be used in the case of prescribed burning of savannas and field burning of agricultural residues.[29]

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[29] Further work is needed in assessing analysis undertaken by Annex I Parties in this field.

Table 9. Sector-specific adjustment methods applicable to the agriculture sector

Source category: **4.A Enteric fermentation - CH_4** **4.B Manure management - CH_4 and N_2O** **4.C Rice cultivation - CH_4** **4.D Agricultural soils – N_2O** **4.E Prescribed burning of savannas - CH_4 and N_2O** **4.F Field burning of agricultural residues - CH_4 and N_2O**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/ missing	Method inappropriate/ missing	
A. Interpolation of emission estimates or parameters	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. It may be necessary to use interpolation at the level of emission estimates, emission factors or other parameters, depending on the circumstances; it should be based on trend analysis.
B. Extrapolation of emission estimates or parameters	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	4.A 4.B 4.C 4.D 4.E 4.F	For inappropriate/missing emission factor, parameter or activity data, this method is applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate. It may be necessary to use extrapolation at the level of emission estimates, emission factors or other parameters, depending on the circumstances; it should be based on trend analysis, taking into account year-to-year fluctuations.
C. Extrapolation of emissions using drivers or surrogate data					Not relevant.
D. Application of data from international databases	4.A 4.B 4.C [c] 4.D 4.E [e]	4.A 4.B 4.C [c] 4.D	4.A [a] 4.B [b] 4.C [c] 4.D [d] 4.E [e] 4.F [f]		[a] Source: FAO for livestock population. [b] International data are available for livestock numbers (FAO), but not for manure management systems. [c] Sources: FAO, International Rice Research Institute (IRRI). [d] For direct N_2O emissions: FAO (fertilizers), International Industry Fertilizer Association (IFA); for indirect emissions: international data are partially available (for N-deposition) from the European Monitoring and Evaluation Programme (EMEP). [e] Data on areas of savanna burned are at present not published annually but information ought to be available in the literature (and from satellite images). [f] Annual crop production data are the basis for activity data. Source: FAO.

Table 9. Sector-specific adjustment methods applicable to the agriculture sector *(continued)*

Source category: **4.A Enteric fermentation - CH_4** **4.B Manure management - CH_4 and N_2O** **4.C Rice cultivation - CH_4** **4.D Agricultural soils – N_2O** **4.E Prescribed burning of savannas - CH_4 and N_2O** **4.F Field burning of agricultural residues - CH_4 and N_2O**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate	Activity data inappropriate/ missing	Method inappropriate/ missing	
E. Application of IPCC default value		4.A 4.B 4.C 4.D [b] 4.E 4.F	4.A 4.B [a] 4.C 4.D [b]		[a] The 1996 IPCC Guidelines provide data on how to partition the activity data between management systems. [b] Adjustments to be based on IPCC tier 1.a methods.
F. Application of an average parameter for a cluster of countries		4.A [a] 4.B 4.C			[a] For countries with similar conditions.
G. Application of IPCC tier 1 methods	4.A [a] 4.B [a] 4.C [a] 4.D [a,b] 4.E [a] 4.F [a]	4.A 4.B 4.C 4.D 4.E 4.F		4.A 4.B 4.C 4.D 4.E 4.F	[a] Requires activity data as input. [b] Application of IPCC tier 1 to supply missing estimate.
H. Emission estimation using an average Annex I emission rate and a country-specific driver					
I. Linkage of emissions between gases or source categories			4.D [a] 4.E [b] 4.F [b]		CH_4 and N_2O from manure management use the same activity data. [a] N_2O from pasture, range and paddock manure is to be estimated as other manure management systems. [b] The same activity data are used for CH_4 and N_2O.
J. Interpolation of missing activity data			4.A 4.B 4.C 4.D 4.E [a] 4.F		Interpolation of activity data should be based on trend analysis, taking into account year-to-year fluctuations. [a] The same activity data are used for CH_4 and N_2O.

4. Relevant international sources of activity data and possible drivers

64. For adjustment methods taking activity data into consideration, the following international data sources can be used to obtain data on agriculture (see also table 9):

(a) United Nations: FAO (e.g. for livestock population, rice and crop production, fertilizer use)

(b) International Rice Research Institute (IRRI)

(c) International Industry Fertilizer Association (IFA)

(d) European Monitoring and Evaluation Programme (EMEP)

65. The use of drivers is not relevant in any calculation of adjustments in the agriculture sector.

F. 5 Land-use change and forestry

(To be elaborated after the completion of the IPCC good practice guidance on land-use change and forestry.)

G. 6 Waste

1. General characteristics of the sector

66. The waste sector includes all GHG emissions from solid waste disposal on land, waste-water handling and waste incineration. Solid waste generation, composition and disposal/treatment practices and water disposal/treatment are economically, culturally and politically driven and can vary widely from one country to another, and also with time.

67. Methane emissions from solid waste disposal on land is the most important source in the waste sector. The availability of activity data and parameters used in the calculation influences the choice of method and the estimated emissions.

68. GHG emissions from waste-water treatment vary a great deal from country to country depending on waste-water treatment systems and climate. Emissions from industrial waste-water treatment also depend very much on the type of industry. The IPCC Guidelines do not provide methods for estimating N_2O emissions from industrial waste water, and methods for estimating N_2O emissions from domestic waste water are relatively simple. Some countries apply more sophisticated methods for estimating these emissions.

69. Waste incineration is a minor source of GHG emissions in most countries. Some countries report these emissions in the energy sector.

2. Methods applicable or not applicable to this sector

70. For all source categories in the waste sector, there is the possibility of supplying a missing estimate by applying IPCC default methods. This should, however, not be used if activity data are declining. Also, the activity data need to be adjusted accordingly before using this method. For inappropriate emission factors, IPCC default values or values from international databases could be used in all cases.

71. When using interpolation/extrapolation of emission estimates or other parameters, care has to be taken with declining trends; this is also generally applicable to all source categories.

Table 10. Sector-specific adjustment methods applicable to the waste sector

Source category: **6.A Solid waste disposal sites - CH_4** **6.B Domestic and industrial waste-water handling** **6.C Waste incineration**	*Missing estimate*	*Not prepared in accordance with the IPCC guidelines as elaborated by the IPCC good practice guidance*			Comments
		Emission factor or other parameter inappropriate/missing	Activity data inappropriate/ missing	Method inappropriate	
A. Interpolation of emission estimates or parameters	6.A 6.B 6.C	6.A [a] 6.B [a] 6.C [a]	6.A [a] 6.B [a] 6.C [a]		For declining trends extrapolation/interpolation should be done carefully (see the IPCC good practice guidance). [a] Applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
B. Extrapolation of emission estimates or parameters	6.A 6.B 6.C	6.A [a] 6.B [a] 6.C [a]	6.A [a] 6.B [a] 6.C [a]		
C. Extrapolation of emission estimates or parameters using drivers or surrogate data	6.A 6.B	6.A [a] 6.B [a]	6.A [a] 6.B [a]		For relevant drivers for source categories 6.A and 6.B, see table on drivers (table 11). For 6.C Waste incineration, no generally applicable drivers were identified. [a] Applicable only in cases where data are missing and/or when in a particular year of the time series the data are inappropriate.
D. Application of data from international databases		6.A 6.B 6.C	6.A [a] 6.B		[a] Population, urban population or GDP per capita and waste generation rates could be used to estimate the volume of solid waste.
E. Application of IPCC default value		6.A 6.B 6.C	- 6.B		
F. Application of an average parameter for a cluster of countries	6.A 6.B [b]	6.A 6.B [b]	6.A [a] 6.B [b]		If estimates are provided for some years and data are available, method F should not be applied. Limitation: The cluster of countries should be carefully selected, based mainly on waste management practices (see the IPCC good practice guidance). [a] Population, urban population or GDP per capita and waste generation rates could be used to estimate the volume of solid waste. [b] Not applicable for industrial waste water.
G. Application of IPCC default method	6.A 6.B 6.C			6.A 6.B 6.C	In accordance with the IPCC good practice guidance, the IPCC default method should not be used for declining trends in activity data. Adjustments could be calculated using this method if the activity data are adjusted accordingly.
H. Emission estimation using an average Annex I emission rate and a country-specific driver	- 6.B	6.A		- 6.B	For 6.C Waste incineration, no generally applicable drivers were identified.
I. Linkage of emissions between gases or source categories	-	-	-	-	

3. Conservative approach in the waste sector

72. For all source categories of the waste sector (CH_4 from solid waste disposal sites, domestic and industrial waste-water handling and waste incineration) conservative point estimates, in line with the criteria for a conservative approach outlined in paragraph 20 above, can generally be obtained based on:

(a) Conservative parameters or, in the case of waste incineration, emission factors selected from a range of possible values;

(b) Uncertainty ranges around a point estimated from uncertainty data available from other Parties with similar circumstances (however, in the case of waste-water handling this possibility is applicable only to domestic waste water).

73. For CH_4 from solid waste disposal on land, it is also possible to make conservative estimates by choosing conservative values from a range of possible activity data.

74. In all cases the selection of conservative parameters, emission factors or activity data, as appropriate, should aim to produce final adjusted estimates for the base year and years of the commitment period consistent with the principles and percentiles set out in paragraph 20 above.

4. Relevant international sources of activity data and possible drivers

75. For methods of extrapolation of emissions or parameters based on the use of drivers or surrogate data (method C), as appropriate, drivers as given in table 11 below could be used.

Table 11. Possible drivers for emissions from the waste sector

Source category	Possible drivers	International data sources
6.A CH_4 emissions from solid waste disposal sites	Population/urban population GDP per capita	National statistics United Nations statistics/OECD/ Eurostat (for Europe)
6.B.2 Domestic waste-water handling	Urban population	National statistics United Nations statistics/OECD/ Eurostat (for Europe)
6.B.1 Industrial waste-water handling	Production data associated with the main industries in a specific country as described in table 5.4 of the IPCC good practice guidance.	National statistics United Nations statistics/OECD/ Eurostat (for Europe)

Appendix I

Explanations to assist in the preparation of conservative adjustments

1. Some methods per se produce estimates that tend to be higher than those obtained by other methods. This is the case, for example, when the method takes into account the delay between an activity and the emission. For example, potential emissions of fluorinated gases (production plus imports minus destruction minus exports) are usually higher than actual emissions (that proportion which is released into the atmosphere). In the waste sector, emissions from landfills can be related to the amount of waste deposited in that year or to the amount of waste that has been deposited in the landfill over a number of years.

2. Hence, it is not necessary that estimates for all estimation methodologies be calculated before the appropriate most conservative method is chosen. It means, rather, that such an inherently conservative method be chosen, where possible.

3. The examples below outline how the percentiles established in paragraph 20 would apply for the possible approaches indicated in paragraphs 20 (a)-(c) and 21 (see section III of the guidance).[30]

4. Example of paragraph 20 (a): The estimate for CH_4 emissions from enteric fermentation for cattle is not provided. Application of the tier 1 method using FAO statistics (e.g. 1,000,000 head) and, in the absence of other information, the range of relevant emission factors for dairy and non-dairy cattle (48-118 kg/head/yr) given in the IPCC Guidelines results in a range of emissions of 48 to 118 Gg CH_4. The possible range of estimates is thus 48–118 Gg CH_4. The 75th percentile[31] of this range would be: 48 Gg + [(118 Gg – 48 Gg) / 4x3] = 101 Gg. Thus the adjusted value to be used for a year of the commitment period would be 101 Gg.

5. Example of paragraph 20 (b): The estimate for CH_4 emissions from enteric fermentation for cattle is not provided. Application of two or more methods results in a range of possible emissions. In addition to the method above, interpolation of emissions could be used to obtain a value. If the value for year four of a five-year period is missing, and the values for years one to three and five were as follows: 64.6 Gg, 66.5 Gg, 65.3 Gg and 67.8 Gg, respectively, the linearly interpolated value for year four would be 66.9 Gg. In this case the 75th percentile of the range of estimates (48 Gg, 66.9 Gg, 118 Gg) would also be 101 Gg as in example for paragraph 20 (a).

6. Example of paragraph 20 (c): The estimate for N_2O emissions from adipic acid production is not provided. One means of adjustment would be to apply the default by multiplying the activity data (e.g. 1000 kg) by the default emission factor. If there is only one emission factor (e.g. 300 g N_2O/kg adipic acid), the uncertainty information given in the guidelines would be used to make the estimate conservative. In this case the IPCC good practice guidance states that the emission factor's uncertainty is +/- 10 per cent. Applying the uncertainty to the estimate provides a range from 270 kg to 330 kg for the possible emission estimates. Using the 75 percentile rule would result in 315 kg (300 + (30/2) = 315) as the final adjusted estimate.

7. Example of paragraph 21: The estimate for CH_4 emissions from manure management for swine is not provided. It is possible to select conservative parameters to obtain a conservative point estimate of emissions. The activity data used could be taken from the FAO (e.g. 36,572,000 head) and from extrapolation of activity data from previous years (e.g. 36,959,000 head), and the range of emission

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[30] Once an assessment of the methods detailed in this guidance has been completed (see paragraphs 14 and 15 of section III Conclusions), the examples given in this annex may be revised, as appropriate.

[31] The 75th percentile is the point at which 75 per cent of the possible estimates are below and 25 per cent of the possible estimates are above.

factors for Annex I could be taken from the IPCC Guidelines: 3 to 19 kg/head/yr. Using the 75th percentile for the range of activity data and the range of emission factors would provide conservative parameters of 36,862,000 head (36,572,000 + [(36,959,000 – 36,572,000) / 4x3] = 36,862,000) and 15 kg/head/yr (3 + [(19 – 3) / 4x3] = 15). These parameters would result in an emission estimate of 552.9 Gg CH_4.

Appendix II

1. The following paragraphs summarize the provisions that are relevant to adjustments as included in the guidelines for review under Article 8 of the Kyoto Protocol.

Procedures

2. Within the review of the inventory, the expert review team shall list all the problems identified, indicating which would need an adjustment, and send this list to the Annex I Party no later than twenty-five weeks from the submission due date of the annual inventory. This list is prepared under the collective responsibility of the expert review team.

3. The Annex I Party shall comment on these questions within six weeks and, where requested by the review team, may provide revised estimates.

4. If still needed, the expert review team shall calculate adjustments in accordance with this guidance, in consultation with the Party concerned and shall prepare a draft individual inventory review report, which includes, where appropriate, adjusted estimates and related information, within eight weeks of the receipt of the comments on the questions posed, and shall send the draft report to the Party concerned.

5. The Annex I Party shall be provided with four weeks to comment on the draft individual inventory review report and, where appropriate, on whether it accepts or rejects the adjustment, including its rationale. If the Party concerned disagrees with the proposed adjustment(s) the expert review team should send the notification from the Party, along with the recommendation of the expert review team in its final report to the COP/MOP and the Compliance Committee, which will resolve the disagreement in accordance with the procedures and mechanisms on compliance.

Reporting

6. The following information on adjustments shall be reported by the expert review teams in the review reports:

(a) The original estimate, if applicable;

(b) The underlying problem;

(c) The adjusted estimate;

(d) The rationale for the adjustment;[32]

(e) The assumptions, data and methodology used to calculate the adjustment;

(f) A description of how the adjustment is conservative;

(g) The expert review team's identification of possible ways for the Annex I Party to address the underlying problem;

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[32] This includes procedures for selection of the calculation methods used for the adjustments.

(h) The magnitude of the numerical values related to an adjusted problem as:

(i) The percentage by which the aggregate adjusted GHG emissions for an Annex I Party exceed the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and taken from the sources listed in Annex A to the Kyoto Protocol, for any single year;[33]

(ii) The sum of the numerical values of the percentages calculated in subparagraph (i) above for all years of the commitment period for which the review has been conducted;

(i) The number of reviews that identified and adjusted the problem previously, and the percentage that the key source category contributed to the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and taken from the sources listed in Annex A to the Kyoto Protocol;

(j) An indication whether the adjustment was agreed upon by the Annex I Party and the expert review team.

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[33] "Any single year" refers to the years of the commitment period.